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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,310	02/26/2004	Kazumi Furuta	04115/HG	9200

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FRISHAUF, HOLTZ, GOODMAN & CHICK, PC
220 Fifth Avenue
16TH Floor
NEW YORK, NY 10001-7708

EXAMINER	
WOLLSCHLAGER, JEFFREY MICHAEL	
ART UNIT	**PAPER NUMBER**
1732	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/17/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/789,310	FURUTA ET AL.	
	Examiner	Art Unit	
	Jeff Wollschlager	1732	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 October 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-37* is/are pending in the application.

4a) Of the above claim(s) *14-31* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *32-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's amendment to the claims, specification, and title filed October 25, 2006 has been entered. Claims 1-13 are canceled. Claims 14-31 remain withdrawn from further consideration. Claims 32-37 are new. The objection to the title is withdrawn.

Specification

The disclosure remains objected to because of the following informalities: The specification contains numerous grammatical errors. A thorough review of the specification and appropriate correction is required. The examiner notes the amendment to the early parts of the specification (pages 1-7) and further notes that a similar review of the remainder of the specification is to be completed.

Claim Objections

Claims 33 and 36-37 are objected to because the recitations "when a concerned error, being one of said thickness errors, is positive" and "when a concerned error, being one of said thickness errors, is negative" are cumbersome. The broadest reasonable interpretation of the claims is understood to require different adjustments be made in response to different thickness measurements of the film since a positive error, for example, can mean that the film is either thicker or thinner than desired.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 32, 33, 35 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Tzu et al. (U.S. Patent 5,994,009; issued November 30, 1999).

Regarding claims 32 and 35, Tzu et al. teach a method for achieving a desired pattern on a substrate comprising a resist while employing electron beam depiction (Abstract; col. 1, line 62-col. 2, line 10). Tzu et al. measure the thickness of the resist film (col. 8, lines 28-32) and adjust the spacing between the gratings (col. 7, lines 12-67) or the electron beam dosage (col. 4, lines 11-23) in response to the measured thickness of the film (Figure 4A and 4B; col. 2, lines 59 - col. 3, lines 7; col. 3, lines 33-57; col. 4, lines 43-48; col. 4, line 62-col. 5, line 3).

As to claims 33 and 36, Tzu et al. teach utilizing a software package to determine and make the required adjustments to the spacing and the dose (col. 4, lines 62-col. 5, line 3)

Claims 35-36 are rejected under 35 U.S.C. 102(b) as anticipated by Nozue (JP 02087616; published March 28, 1990).

Regarding claim 35, Nozue teaches an electron beam lithography method wherein the size of the pattern/diffraction grating is controlled by first measuring the

thickness of a resist film; employing a computer to automatically compute the required electron beam dose based on the thickness of the film; and then depicting the pattern by scanning the electron beam onto the resist film (Abstract; Figure 2; Figure 3; and Figure 4). The examiner notes that the patterns formed by Nozue are understood to reasonably read on the claimed diffraction gratings.

As to claim 36, Nozue teaches adjusting the dose as a function of the thickness of the resist film (Figures 3 and 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent 6,342,969) in view of Nozue (JP 02087616).

Regarding claim 35, Lee teaches a method of employing electron beam lithography to depict diffraction gratings on a resist film (Abstract; col. 2, lines 6-col. 3, line 3; col. 5, lines 33-58). Lee does not disclose adjusting the dose of the electron beam in response to variations in the film thickness. However, Nozue discloses an electron beam lithography method that adjusts the dose of the electron beam in response to measured film thickness (Abstract).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to modify the method of Lee by incorporating the method of adjusting the electron beam dose in response to the measured film thickness as disclosed by Nozue, for the purpose as taught by Nozue, of more accurately controlling the size of the pattern/diffraction grating (Abstract).

As to claim 36, Nozue teaches adjusting the dose as a function of the thickness (Figures 3 and 4).

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent 6,342,969) in view of Nozue (JP 02087616) as applied to claims 35-36 above, and further in view of Dilday et al. (U.S. Patent 6,484,940).

As to claim 37, Lee in view of Nozue teach the method of claim 36 as discussed in the 103(a) rejection above. Lee does not specify the specific surface features of the cards, such as a credit or ATM card, employed (col. 1, lines 9-15; col. 4, lines 20-25).

However, Dilday et al. disclose a data storage card such as an ATM card or credit card (col. 12, lines 57-63) wherein the card has a curved surface portion (Figure 1 and Figure 2).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to practice the method disclosed by Lee in view of Nozue on cards with a curved surface, such as the cards disclosed by Dilday et al. for the purpose, as disclosed by Dilday et al. of employing a card having both optical and magnetic data storage areas formed to cooperatively engage various readers (Abstract).

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nozue, as applied to claims 35-36 above, in view of Wolfe et al. (U.S. Patent 6,372,391).

As to claim 37, Nozue teaches the method of claim 36 as discussed in the 102(b) rejection above, but does not specify the shape of the wafer. However, Wolfe et al. show that it is known to depict patterns/gratings on flat and curved semiconductor substrates/wafers (col. 7, lines 46-65).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to practice the method disclosed by Nozue on wafers of various conventional shapes, including a curved shape as disclosed by Wolfe et al., for the purpose of realizing the benefits of practicing the method of Nozue on a variety of conventional substrates for specific applications.

Claims 32, 33, 35 and 36 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Greeneich (U.S. Patent 4,264,711).

Regarding claims 32 and 35, Greeneich teaches a method of compensating for the proximity effect in electron beam lithography, wherein the spacing/gap between gratings/lines (col. 1, lines 6-60) or the electron beam dose (col. 1, lines 61-col. 2, lines 11) is adjusted to achieve the desired results. Greeneich further discloses that the thickness of the resist film impacts what adjustment to the spacing or the electron beam dose is to be made (col. 1, lines 54-60; col. 1, lines 66-col. 2, line 5). As such, it is understood that the actual thickness of the resist would have been known by Greeneich through measuring the thickness of the resist in order to make the appropriate adjustment to the spacing or electron beam dose. As such, Greeneich anticipates the claimed invention.

Alternatively, it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to measure the thickness of the resist disclosed by Greeneich since Greeneich teaches that the thickness of the resist is a critical variable that impacts the adjustments to be made to the spacing or the electron beam dose.

As to claims 33 and 36, it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to make the required adjustments to the spacing of the gratings/lines and the electron beam dose, in view of

the teaching of Greeneich, through routine experimentation and optimization in order to achieve the desired results, as is routinely practiced in the art.

Claims 34 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greeneich (U.S. Patent 4,264,711), as applied to claims 32, 33, 35 and 36 above, in view of Wolfe et al. (U.S. Patent 6,372,391).

As to claims 34 and 37, Greeneich teaches the method of claims 32 and 36 as discussed above, but does not specify the shape of the chip. However, Wolfe et al. show that it is known to depict patterns/gratings on flat and curved semiconductor substrates/chips (col. 7, lines 46-65).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to practice the method disclosed by Greeneich on chips of various conventional shapes, including a curved shape as disclosed by Wolfe et al., for the purpose of realizing the benefits of conventional substrates for a broad range of applications.

Claims 34 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tzu et al. (U.S. Patent 5,994,009), as applied to claims 32, 33, 35 and 36 above, in view of Wolfe et al. (U.S. Patent 6,372,391).

As to claims 34 and 37, Tzu et al. teach the method of claims 32 and 36 as discussed above, but do not specify the shape of the wafer. However, Wolfe et al. show

that it is known to depict patterns/gratings on flat and curved semiconductor substrates/chips (col. 7, lines 46-65).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to practice the method disclosed by Tzu et al. on wafers of various conventional shapes, including a curved shape, as disclosed by Wolfe et al., for the purpose of realizing the benefits of conventional substrates for a broad range of applications.

Response to Arguments

Applicant's arguments, filed October 25, 2006, with respect to new claims 32-37 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

All claims are rejected.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Watson (U.S. Patent 5,736,281) discloses a method of modifying the electron beam dose to compensate for the proximity effect.

Maker et al. (U.S. 5,393,634) disclose a method for producing a phase hologram through electron beam lithography.

Boettiger et al. (U.S. 5,111,240) disclose an analogous electron beam lithography method.

Meiri et al. (U.S. 5,241,185) and Rieger et al. (U.S. 6,081,658) disclose methods for correcting the proximity effect resulting from E-beam lithography.

Maker et al. (U.S. 6,480,333) disclose creating diffraction gratings on curved surfaces.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Wollschlager whose telephone number is 571-272-8937. The examiner can normally be reached on Monday - Thursday 7:00 - 4:45, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JW

Jeff Wollschlager
Examiner
Art Unit 1732

January 3, 2007

CHRISTINA JOHNSON
SUPERVISORY PATENT EXAMINER
1/8/07